Can You Hear the Beat?

Evaluating Paramedicine Students' Accuracy in Heart Sound Recognition

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Introduction

Cardiac auscultation is a key component of the cardiovascular examination and an essential physical assessment for paramedics in primary and community care (1,2). As the profession shifts toward preventative and out-of-hospital care, paramedics are required to detect subtle clinical signs (3). Recognising abnormal heart sounds, such as murmurs or extra sounds, supports early detection of conditions like valvular disease, heart failure, and infective endocarditis, enabling timely referral and improved outcomes.

Cardiovascular disease (CVD) accounted for nearly 12% of Australia's total disease burden in 2023, ranking fourth after cancer, mental and substance use disorders, and musculoskeletal conditions (4). This highlights the value of low-cost, accessible diagnostic tools like auscultation in both community and acute care. In emergencies, missed findings can have immediate consequences, for example, administering GTN in undiagnosed aortic stenosis may cause critical hypotension (5).

While point-of-care ultrasound (POCUS) offers greater accuracy, its cost and training demands limit widespread use in paramedicine (6). Auscultation, by contrast, is portable, affordable, and suited to home, clinic, or scene-based assessments, supporting effective decision-making, triage, and referral.

Despite its benefits, auscultation accuracy can be variable (7) and declines without regular, deliberate practice. Embedding structured auscultation training into paramedicine curricula is essential to maintain competence across both emergency and primary care roles.

This pilot study aimed to assess paramedicine students' accuracy in identifying a range of heart sounds using a simulated auscultation platform, and to compare second- and third-year cohorts to explore potential skill decay since initial training.

Methods

This quasi-experimental simulation study involved second- and third-year paramedicine students at Griffith University. Participants auscultated seven heart sound scenarios across six anatomical sites (carotids left/right, aortic, pulmonic, tricuspid, and mitral) using the iSimulate® AURiS™ app. Cases included one with carotid bruits, four featuring murmurs at different valves, and two with extra heart sounds. Overall and subcategory scores (normal, abnormal, murmurs, extra sounds) were compared between year levels using descriptive and inferential statistics.

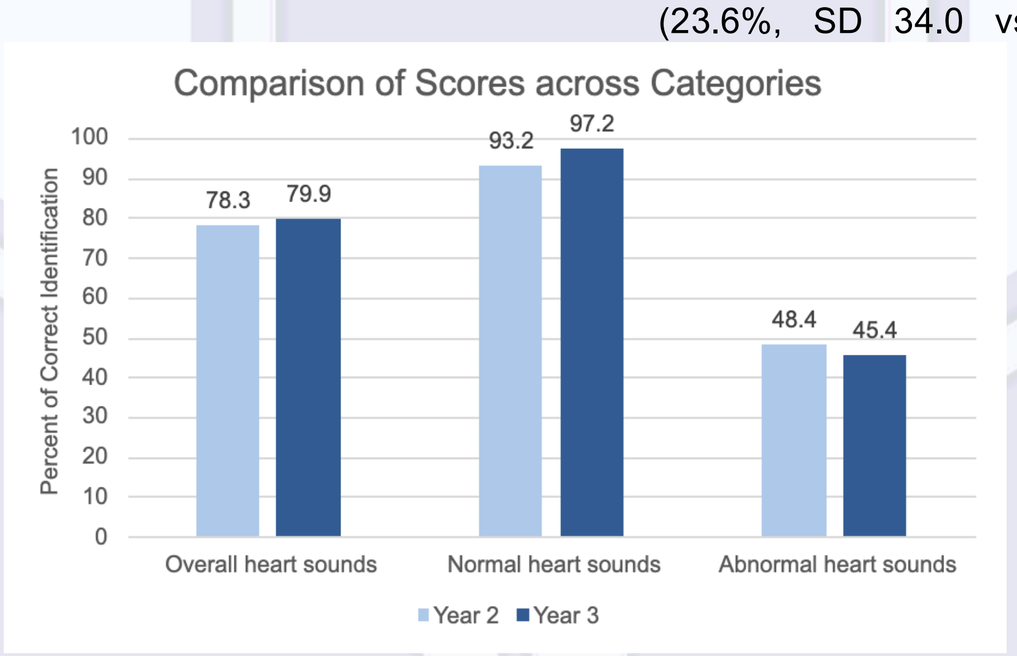

Figure 1: Comparisons of All Scores

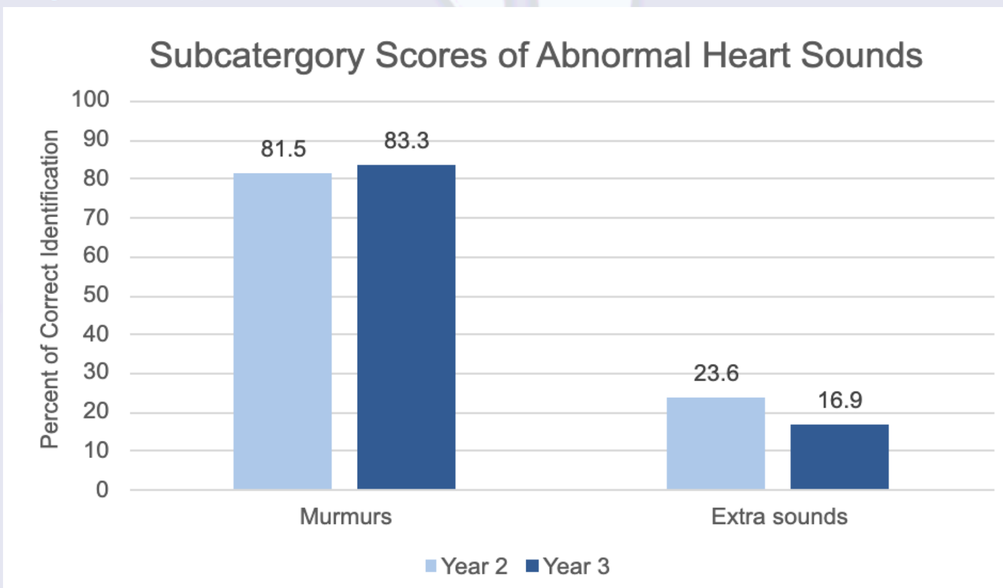

Figure 2: Comparison of Abnormal Heart Sound Scores

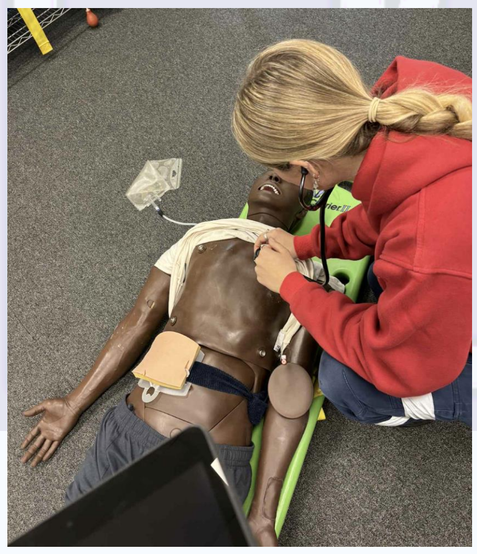

Figure 3: Heart Sound Auscultation Study

Results

Thirty-two students participated (n=32), including 18 second-years (56.3%) and 14 third-years (43.7%). Mean overall scores were similar between second-years (78.3%, SD 10.9) and third-years (79.9%, SD 7.4), with no significant difference (p=0.325, 95% CI -8.6 to 5.3). Third-years scored significantly higher on normal sounds (97.2%, SD 4.5 vs 93.2%, SD 13.3; p=0.013). Second-years performed better on abnormal sounds (48.4%, SD 24.1 vs 45.4%, SD 21.8; p=0.588), murmurs (81.5%, SD 22.8 vs 83.3%, SD 22.6; p=0.872), and extra heart sounds (23.6%, SD 34.0 vs 16.9%, SD 30.1; p=0.463), though these differences were not significant.

Discussion

This pilot study compared second- and third-year paramedicine students' accuracy in identifying heart sounds on a simulated auscultation platform to explore potential skill decay. Students recognised normal sounds well and performed reasonably with abnormal and murmur sounds, but extra heart sounds were the most challenging, scoring lowest.

Second-years marginally outperformed third-years in abnormal sound recognition, likely reflecting the shorter interval since training. This suggests potential skill decay without regular reinforcement, supporting the need for repeated exposure across the curriculum (8). Previous research shows that while paramedics encounter abnormal heart sounds (9), accurate identification often requires ongoing, targeted training. Skill degradation in rarely practised tasks is well-documented among first responders, with studies emphasising that without structured refreshers, both cognitive and psychomotor competencies can decline significantly over time (10).

The difficulty in recognising extra heart sounds in this study mirrors findings in other studies where even experienced clinicians struggle (11, 12), and overall auscultation skills have declined (13, 14). In prehospital, rural, or resource-limited settings, recognising abnormal heart sounds remains a valuable skill for early decision-making (9, 15).

Simulation-based learning offers a cost-effective way to improve and maintain competence, with repeated, targeted exposure shown to enhance retention (15). Embedding structured auscultation practice throughout paramedicine programs, particularly for challenging sounds, may help prevent skill decay and better prepare graduates for accurate, timely assessment in the field.
Griffith University has shown promise in this space, providing structured training that lays a strong foundation for students to develop and maintain this critical clinical skill.

References

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